

Example of AMPL USE

Problem:

$$\begin{aligned}
 & \min_{(x,y,z)} z \\
 \text{subject to } & g_0(x, y, z) = x^2 + 3x^4 - 2y^2 - z \leq 0, \\
 & g_1(x, y, z) = -\frac{1}{2}(x^2 + y^2) + y^4 + 3xy - z \leq 0, \\
 & g_2(x, y, z) = -2x^2 + y^2 - z \leq 0, \\
 & g_3(x, y, z) = -\frac{1}{2}(x^2 + y^2) + x^2y^2 - 3xy - z \leq 0.
 \end{aligned}$$

AMPL Model

```

var x1;
var x2;
var x3;
minimize objective: x3;
subject to constraint_1: x2**2-2*x1**2+3*x1**4-x3 <= 0;
subject to constraint_2: -2*x2**2+x1**2+x2**4-x3 <= 0;
subject to constraint_3: -0.5*x2**2-0.5*x1**2+3*x1*x2-x3<=0;
subject to constraint_4: -0.5*x2**2-0.5*x1**2-3*x1*x2+x1**2*x2**2-x3<=0;
let x1:=1;
let x2:=1;
let x3:=1;

```

AMPL Commands

```

solve;
display x1,x2,x3;
display constraint_1.dual, constraint_2.dual, constraint_3.dual, constraint_4.dual;

```